by the action of water, the columns will fall and form a pile of debris at the foot of the mountain, till it is slowly reduced to material light enough for transportation by aid of the rains and rivers.

The duration of the picturesque aspect presented by these mountain façades is limited. With nearly every year new architectural forms of columnar structure appear, until the whole of the mountain has disappeared.

This process of continuous detachment of masses of rock is materially assisted by vegetable growth, which rises in the fissures of the walls. During the dry season the process of vegetation ceases, and dies off. The dry material usually becomes ignited, enveloping the whole district in a slowly-consuming fire. During night time the appearance of those mountain fires is fearfully magnificent. In my memory I see at the present time those burning mountains before me. I remember my hurried ride, on muleback, and I still hear the noise of the bursting and falling rocks.

The occurrence of prairie and mountain fires, principally in the hot and low regions of Honduras, contributes, to a great extent, towards a rapid decay of the present mountain forms.—M. J. R. FRITZ-GAERTNER, PH.D.

(*To be continued.*)

GEOLOGY AND PALEONTOLOGY.

The Barking Sands of the Hawaiian Islands. — The following is an abstract of a paper read on this subject read before the American Association for the Advancement of Science, at Indianapolis, August, 1890:

About a year ago I read to this association a condensed account of an examination of the Mountains of the Bell (Jebel Nagous) on the Gulf of Suez, and of the acoustic phenomenon from which it is named. In continuation of my researches on sonorous sand, which are conducted jointly with Dr. Alexis A. Julien, of New York, I have now visited the so-called "Barking Sands" on the island of Kauai. These are mentioned in the works of several travelers (Bates, Frink, Bird, Nordhoff, and others), and have a world-wide fame as a natural curiosity; but the printed accounts are rather meagre in detail, and show their authors to have been unacquainted with similar phenomena elsewhere.

On the south coast of Kauai, in the district of Mana, sand-dunes attaining a height of over one hundred feet extend a mile or more nearly parallel to the sea, and covering hundreds of acres with the water-worn and wind-blown fragments of shells and coral. The dunes are terminated on the west by bold cliffs (Pali), whose base is washed by the sea; at the east end the range terminates in a dune more symmetrical in shape than the majority, having on the land side the appearance of a broadened, truncated cone. The sands on the top and on the landward slope of this dune (being about 100 yards from the sea) possess remarkable acoustic properties, likened to the bark of a dog. The dune has a maximum height of 108 feet, but the slope of sonorous sand is only sixty feet above the level field on which it is encroaching. At its steepest part, the angle being quite uniformly 31°, the sand has a notable mobility when perfectly dry, and on disturbing its equilibrium it rolls in wavelets down the incline, emitting at the same time a deep base note of a tremulous character. My companion thought the sound resembled the hum of a buzz-saw in a planing-mill. A vibration is sometimes perceived in the hands or feet of the person moving the sand. The magnitude of the sound is dependent on the quantity of sand moved, and probably to a certain extent upon the temperature. The drier the sand, the greater the amount possessing mobility, and the louder the sound. At the time of my visit the sand was dry to the depth of four or five inches; its temperature three inches beneath the surface was 87° Fahrenheit, that of the air being 83° in the shade (4.30 P.M.).

When a large mass of sand was moved downward I heard the sound at a distance of 105 feet from the base, a light wind blowing at right angles to the direction. On one occasion horses standing close to the base were disturbed by the rumbling sound. When the sand is clapped between the hands a slight, hoot-like sound is heard; but a louder sound is produced by confining it in a bag, dividing the contents into two parts, and bringing them together violently. This I had found to be the best way of testing seashore sand as to its sonorousness. The sand on the top of the dune is wind-furrowed, and generally coarser than that of the slope of 31°, but this also yielded a sound of unmistakable character when so tested. A bag full of sand will preserve its power for some time, especially if not too frequently manipulated. A creeping vine with a blue or purple blossom (kolo-kolo) thrives on these dunes, and interrupts the sounding slope. I found the main slope 120 feet long at its base, but the places not covered by this vine gave

sounds at intervals 160 paces westward. At 94 paces further the sand was non-sonorous.

The native Hawaiians call this place Nohili, a word of no specific meaning, and attribute the sound caused by the sand to the spirits of the dead (uhane), who grumble at being disturbed; sand-dunes being commonly used for burial-places, especially in early times, as bleached skeletons and well-preserved skulls at several places abundantly show.

Sand of similar properties is reported to occur at Haula, about three miles east of Koloa, Kauai; this I did not visit, but, prompted by information communicated by Hon. Vladimar Knudsen, of Waiawa, I crossed the channel to the little-visited island of Niihau. On the western coast of this inlet, at a place called Kaluakahua, sonorous sand occurs on the land side of a dune about 100 feet high, and at several points from 600 to 800 feet along the coast. On the chief slope, thirty-six feet high, the sand has the same mobility, lies at the same angle, and gives when disturbed the same note as the sand of Kauai, but less strong, the slope being so much lower. This locality has been known to the residents of the island for many years, but has never been before announced in print. This range of dunes, driven before the high winds, is advancing southward, and has already covered the road formerly skirting the coast.

The observations made at these places are of especial interest because they confirm views already advanced by Dr. Julien and myself with regard to the identity of the phenomena on sea-beaches and on hill-sides in arid regions (Jebel Nagous, Rigii-Rawan, etc.). The sand of the Hawaiian Islands possesses the acoustic properties of both classes of places; it gives out the same note as that of Jebel Nagous when rolling down the slope, and it yields a peculiar, hoot-like sound when struck together in a bag like the sands of Eigg, Manchester, Mass., and other sea-beaches,—a property that the sand of Jebel Nagous fails to possess. These Hawaiian sands also show how completely independent of material is the acoustic quality, for they are wholly carbonate of lime, whereas sonorous sands of all other localities known to us (now over one hundred in number) are silicious, being either pure selex or a mixture of the same with silicates, as feldspar.

The theory proposed by Dr. Julien and myself to explain the sonorousness has been published elsewhere, but may properly be briefly stated in this connection. We believe the sonorousness in sands of sea-beaches and of deserts to be connected with thin pellicles or films of air, or of gases thence derived, deposited and condensed upon the surface of the sand-grains during gradual evaporation after wetting by

the seas, lakes, or rains. By virtue of these films the sand-grains become separated by elastic cushions of condensed gases, capable of considerable vibration, and whose thickness we have approximately determined. The extent of the vibrations, and the volume and pitch of the sounds thereby produced after any quick disturbance of the sand, we also find to be largely dependent upon the forms, structures, and surfaces of the sand-grains, and especially upon their purity or freedom from fine silt or dust. (Proceedings American Association Advancement Science, 38, 1889.)

"I should be lacking in courtesy to close this without expressing my great obligations to Mr. H. P. Faye, of Mara, and to Mr. George S. Gay, of Niihau, for both a generous hospitality and a sympathetic assistance in carrying out my investigations."

The speaker exhibited photographs of the locality and a specimen of the sand.

In his search after this remarkable sand, Dr. Bolton has had many interesting adventures. He thus describes his first discovery that such a thing as musical sand existed:

"I was walking along the ocean beach at a small place on the northeastern coast of Massachusetts. Suddenly it seemed a dog was barking at me with a peculiar hoarse bark. I stopped and looked around, but the barking had ceased, and there was not a dog nor a living being near. I walked on, and the sound immediately began again. I was puzzled until I looked down and found that my steps in the sand caused the noises. I then gave a vigorous kick into the dry sand, and a prolonged, dismal howl answered me, as though I had kicked a dog. I was astounded. I called some boys to me, and asked them if they had ever noticed that the sand made a noise when people walked on it.

"'Oh, yes!' they said, 'this is the famous musical beach.'

"I felt pretty cheap, for I had never heard of the famous musical beach. I asked them if there was any other place where such sand was found.

"'Not in the United States,' answered the oldest boy, 'but my papa says there is some of it in the Sandwich Islands, where he went one time.'

"When anybody tells me a thing is the only one of its kind I immediately begin to doubt it. I determined then and there to investigate the subject of 'barking' sand. That was in 1883, and much of my time since then has been occupied in my investigations. I have found the sand in small quantities in some seventy places in the

United States, one place in Mexico, one in South America, one in the Sandwich Islands, and one in Arabia."

In 1888, Dr. Bolton went to Arabia, where he had heard there was a beach of the remarkable sand. When he reached that country he found a journey of two weeks across a terrible desert would be necessary to reach the beach, which was on the Gulf of Suez. The Arabs had heard of the "singing" sand, and had a superstitious fear of it. The sheik of the tribe where he was refused to send any of his men with the explorer. Finally, persuasion and gold won him, and a caravan of fourteen camels and as many men set out. There was not a drop of water, no vegetation, no food,—only glaring, drifting sand. All the water and all the food had to be carried with them. It was four weeks before the caravan returned from the desert. It came back worn, weary, and nearly famished, but triumphant, for Dr. Bolton had found the finest beach of musical sand he had ever seen.

Last year he went to the Sandwich Islands, and found more of the sand, just as the little boy had said when he gave the doctor his first information about this curious natural formation. In Southern California is a huge sand-dune, on which are patches of the musical sand. This dune is about seventy feet high; shaped like the half of a lens. The following legend is connected with the spot:

Many years ago there was a flourishing monastery at this place, but, owing to the wickedness of the monks, it was overwhelmed by drifting sand. The monastery bells, however, were not involved in the fall of the monks, having been blessed with due ceremony by high ecclesiastics, hence the sound of these holy bells are still heard at matins and vespers. The only similar sonorous dunes known are Jebel Nagous, in Arabia, Rig-i-Rawan, in Afghanistan, and one of a similar name in Persia, Nohili, in Kauai, and possibly one in Churchill county, Nevada.

On Two New Species of Mustelidæ from the Loup Fork Miocene of Nebraska.—Stenogale robusta sp. nov.—Established on a left mandibular ramus which lacks only the posterior border, and which contains in place the molars two to five inclusive, and the root of the canine. The technical characters are those of Stenogale Schlosser, differing only from Mustela in the cutting-blade of the heel of the inferior sectorial. The species is much more robust than those referred to the genus by Dr. Schlosser. The inferior border of the ramus below the coronoid process, is obliquely flattened, and inflected in a way not seen in the *Mustela pennantii*, forming a strong inferior border to the masseteric fossa. The dental foramen is a little

above the angle of this inflection, and is below the middle of the coronoid process. There are several small mental foramina. The canine tooth is of large size. The fourth premolar is close to it, and is one-rooted. Other premolars with compressed crowns, the first with a weak posterior cutting lobe. The sectorial has the proportions seen in Mustela, and possesses a well-marked metaconid. The blade of the heel is external, and there is a low internal basal cingulum of the heel only. Tubercular molar small, one-rooted.

Measurements.—Length of dental series, 47 mm.; diameter of base of canine, 7 mm.; length of premolar series, 22 mm.; length of sectorial, 12 mm.; length of heel of, do, 5 mm.; depth of ramus at P. M. $\frac{4}{}$, 13 mm.; do, at sectorial, 14 mm.

The depth and thickness of this ramus are identical with those of the jaw of the *Mustela pennantii*, but the length is considerably less.

Brachypsalis pachycephalus gen. et. sp. nov. *Char. gen.* Dental formula: I.?; C. $\frac{1}{1}$; P. M. $\frac{4}{}$; M. $\frac{2}{}$. Inferior sectorial with a wide basin-shaped heel, which is as long as the contracted blade; a metaconid.—This genus has the dental formula of the typical Mustelæ, but it is extremely microdont, having a small sectorial blade and wide basin-shaped heel as in the genus Lutra, to which it is evidently allied.

Char. specif.—Founded on a left mandibular ramus which lacks the portions anterior to the canine, and posterior to the coronoid. The sectorial is the only tooth preserved. Posterior border of the heel lobulate. P. M. $\frac{4}{}$ well developed, one-rooted. P. M. $\frac{3}{}$ with the anterior root reduced. P. M. $\frac{2}{}$ and $\frac{1}{}$ very robust, no. $\frac{1}{}$ shorter than the sectorial. M. $\frac{2}{}$ robust, the root grooved on each side. At the P. M. $\frac{1}{}$ the ramus is twisted externally. The anterior face of the coronoid is as wide as the ramus at the sectorial, and the M. $\frac{1}{}$ is in front of its internal border. The dental foramen is behind the base of the coronoid, a little nearer the alveolar level than the inferior border of the ramus. Masseteric fossa strongly defined in front and below, and with a distinct median fundus.

Measurements.—Length of dental series from and exclusive of canine, 55 mm.; length of premolar series, 31 mm.; length of sectorial, 14.5 mm.; length of heel, 7 mm.; width of, do, 8 mm.; depth of ramus at sectorial, 25 mm.; width of base of coronoid just behind M. $\frac{2}{}$, 14 mm.

This very robust species represented the otters in the central part of North America, during the Loup Fork epoch. Its dimensions were

probably about those of the sea-otter (*Enhydris marina*). No form representing the otters has been known hitherto from this region; but a much smaller species, *Lutrictis lycoptamicus* Cope, has been described from probable Loup Fork beds of Oregon.—E. D. COPE.

Macfarlane's American Geological Railway Guide.[1]—This book is one of especial utility to the geologist, since it is an index to the book of nature, whose pages are disclosed to us in the railway cuttings of the country. Such exposures are the principal source of geological knowledge in the eastern region of our continent, where the generous rain-fall covers the natural scars and abrasions of the earth's surface with ample vegetation. The preparation of such a work was a happy inspiration of the late James Macfarlane, and that a second edition is called for shows that it has met with deserved appreciation. The authorities of the country are generally cited, and information is compiled from all available sources. We think a few more maps would be of much utility. We also find the treatment of the Cenozoic formations to be less thorough than that accorded those of the ages which preceded them. The nomenclature adopted is generally that required by priority, the only exception being found in the reports of Messrs. S. F. Emmons and G. K. Gilbert, of the U. S. Geological Survey, where some names are used which are not warranted by the law of priority or by general custom. Such is the use of Niobrara instead of Loup Fork. Niobrara is the name of a Cretaceous horizon, and has nothing to do with the Loup Fork Miocene.

A Catalogue of British Fossil Vertebrata.[2]—This work supplies a want that paleontologists have felt who are desirous of learning the extended literature of vertebrate paleontology as developed by Englishmen or on English material. This literature is largely prior, of course, to that of America, and it is especially important for Americans to become acquainted with the sources of information and of nomenclature so far as they apply to the paleontology of their country. In this work they will find it fully indexed, and full references given. A nomenclature has been adopted by the authors, so far as it has been personally investigated by them, based on the rules promulgated by all scientific bodies; but in cases where they have followed others they have not adhered to them in that one

[1] An American Geological Railway Guide. By James Macfarlane, Ph.D. Second edition edited by James R. Macfarlane. New York: D. Appleton & Co. 1890. 8vo. pp. 426.

[2] A Catalogue of British Fossil Vertebrata, by Arthur Smith Woodward and Charles Davies Sherborn. London: Dunlan & Co., 37 Soho Square. Jan., 1890. 8vo. pp. 398.

which requires a diagnosis or description for every name as a necessary condition of priority. Thus we find Platychœrops, Protosphyræna, and Hipparion, for which their authors published no separate diagnosis, adopted instead of Miolophus, Erisichthe, and Hippotherium, which were accompanied by diagnoses when first proposed. We hope that in a second edition the work may be made uniform in this respect.

The Cretaceous Saurians of New Zealand.—Prof. James Hector's explorations in New Zealand have led to the accumulation of several tons of blocks of cement-stone containing fossil bones, which have been worked out of the hard matrix by Mr. McKay. The general result is that portions of 43 individual reptiles, mostly of gigantic size, and all of aquatic habits, belonging to at least 13 distinct species, have been discovered. These species represent two distinct groups, the first being true Plesiosaurians belonging to the genera Plesiosaurus, Maurisaurus Héctor (gen. nov. allied to Elasmosaurus Cope), and Polycotylus Cope; the other representing probably the order Pythonomorpha. This order is represented by two distinct genera, Liodon Owen and Taniwhasaursus Hector (gen. nov. allied to Clidastes of Cope). In addition, there are several fragmentary remains, placed provisionally under one or the other of these groups, and two vertebræ belonging to an exceptional form of the genus Crocodilus. Lastly, there is a single vertebrate from Mt. Potts referred to the genus Ichthyosaurus. Plates with descriptions of these interesting fossils are found in the Transactions New Zealand Institute, Vol. VI. A fine series of these saurians has been recently received in Philadelphia by Prof. Cope, who will add them to his private collection.

A Bison at Syracuse, New York.—A bovine skull was exhumed (in laying a sewer) from about ten feet below the surface of the ground, at Syracuse, N. Y. The formation was of black swamp muck underlaid by clay; the skull being found at the junction of the two deposits. No other bones were found. I append a few measurements: Foramen magnum (superior border) to occipital crest, 4½ in.; width of condyles, 5¼ in.; width of skull between horns and eyes, 10¼ in.; width of skull between meati audit. ext., 9⅝ in.; from foramen magnum to end of premaxillæ, 20 in.; width from zyg. arch to its fellow, 9⅝ in.; width of palatines opposite last molar, 3¾ in.; width across premaxillary bones, 4 in.; length of alveoli, 6⅝ in.; nearest approach of orbits to each other, 10½ in.; length of nasals, 8½ in.; width of nasals, 2½ in.; occipital crest to nasal, 10¼ in.; frontal suture closed xcept 2½ in.; circumference of horns at base, 14 in.; length of horn,

greater curvature, 15½ in.; length of horn, lesser curvature, 10 in.; distance from tip to tip of horns, 17¾ in.; distance from base to base of horns, 10¼ in.—LUCIEN M. UNDERWOOD, *Syracuse University, Syracuse, N. Y.*

NOTE BY EDITOR.—Photographs of this skull sent by Mr. Underwood show that it belongs to the bison, *Bos americanus*. This is, I believe, the most northern locality at which it has been found east of the Mississippi valley.—E. D. COPE.

Geological News.—Palæozoic.—In a review of Dr. Ells's Report on the Geology of a Portion of the Province of Quebec, C. D. Walcott agrees with the author in condemning the name Quebec group. In view of many new facts brought to light by the study of the past fifteen years it has become misleading and unintelligible. In its stead Dr. Ells's proposes to use the name Levis for the local development of the Calciferous terrane about Quebec, and the name Sillery for the passage beds and Cambrian strata of the St. Lawrence valley in the vicinity of Quebec. This suggestion has the hearty endorsement of Mr. Walcott.

C. R. Van Hise (Bull. Geol. Soc. Am., Vol. I., pp. 203–244) confirms Newton's views as to the eruptive origin of the granite core of the Blacks Hills, and its pre-Cambrian age. He further states that the zone of schists about it was developed and deeply eroded before the beginning of Palæozoic time.

Sir Wm. Dawson and Dr. G. J. Hinde have recently described some new species of fossil sponges from the Siluro-Cambrian at Little Metis, on the lower St. Lawrence. These specimens are especially interesting since they throw fresh light on the character of the earliest-known forms of these organisms, and their discovery is the more opportune from the fact that our knowledge of the existing hexactinellid sponges —the group to which nearly all these fossils belong—has been vastly increased by the work of Prof. F. E. Schulze, of Berlin, on the hexactinellid sponges dredged up by the Challenger Expedition, and thus we are now better enabled than hitherto to compare the fossil and recent forms. Twelve species, representing six genera, are described and figured.

The second part of the Contributions to the Micro-Paleontology of the Cambro-Silurian Rocks of Canada has been prepared by E. O. Ulrich. It consists of a descriptive report on some fossil Polyzoa and Ostracoda from Manitoba, and is illustrated by two full-page litho-

graphic plates. Of the twenty-five species of Polyzoa eleven are new. The Ostracoda are few, and not in good condition. There are but nine species in all, five of which are new.

The study of the Calciferous formation in the Champlain valley by Profs. Brainard and Seeley has brought a series of surprises: 1. The thickness of the rocks,—little less 2000 feet. 2. The amount of magnesian limestone. 3. The amount of pure limestone. 4. The abundance of fossil forms. 5. The almost entire exclusion of the bird's-eye formation from the Vermont rocks. (Bull. Geol. Soc. Am., pp. 501–516.)

In the Proc. U. S. Nat. Mus., Vol. XII., are found descriptions by C. D. Walcott of fossils from the Lower Cambrian. Of seven corals, two, *Archæocyathus dwightii* and *Ethmophyllum meekii*, are new species. Of worms and molluscs there are three new genera and thirteen new species.

In a report on the Natural Gas in Minnesota Prof. N. H. Winchell makes the following statement: "So far as science affords any evidence in favor of gas below the Trenton limestone in Minnesota, there is perhaps one chance in ten that the formation which is known in the northern part of the State as *Animike slates* and *quartzites*, underlies the county of Freeborn at a depth of 3000 feet. In case it were found at that depth there might be one chance in one hundred that it would contain some gas, and one in a thousand that it would afford enough for economic purposes." (Bull. No. 5, Geol. and Nat. Hist. Survey, Minn.)

Prof. Edw. Orton states as a law that "The pressure of Trenton limestone gas is due to a salt-water column, measured from about six hundred feet above tide to the level of the stratum which yields the gas." (Bull. Geol. Soc. Am., Vol. I.).

In view of the fact that the use of the name Hudson River group has been attended with more or less uncertainty ever since it was promulgated by the geologists of the New York Survey, Mr. C. D. Walcott proposes to use the term Hudson in a generic sense to include a group of formations that occur between the Trenton limestone horizon and the Upper Silurian or Niagara horizon. (Bull. Geol. Soc. Am., Vol. I., pp. 335–356.)

Carbonic.—C. R. Keyes, in discussing variation of a carbonic gastropod, *Platycerus equilaterum* (*Am. Geol.*, June, 1889), emphasizes the fact that accidental station is not the only factor in modifying the form of the shell, but that gravitation also exerts a potent influence.

In America there are probably about a dozen valid species of Naticopsis, the others described as such being identical with forms previously known. *Patica littonana* Hall, from the Warsaw limestone, apparently belongs to the globose group of *Soleniscus*, and will therefore stand as *S. littonanus.* For *Isonema depressa* M. and W. it is proposed to substitute the name *Naticopsis linearis.* (C. R. Keyes, *Am. Geol.*, October, 1889.)

H. A. Wasmuth, in the *Am. Geol.*, May, 1888, closes a description of the Pittsburgh Coal Bed with a reference to the Devonian formations, reservoirs of gas and oil, that underlie it. Naturally, the greatest amount of gas should be found on the higher elevations (anticlinals), and of oil in the deeper portions of synclinals of the Devonian formations; but as this theory is refuted by geologists of reputation, there remains the influence of disconnections and dislocations of the oil- and gas-bearing strata by clay veins, etc., to explain the productivity of the oil- and gas-wells of Pennsylvania.

Jurassic.—R. Lydekker announces the discovery of a new crocodile, *Suchodus durobrivensis*, from the Oxford clay of Peterborough. (*Quar. Jour. Geol. Soc.*, May, 1890.)

A. Smith Woodward notes three small Ichthyolites from the Paper Shales of Wigston, referable to a small species of Pholidophorus, *P. nitidus* Egerton. (Trans. Leicester Lit. and Philosoph. Soc., April, 1889.)

R. Lydekker has referred two vertebræ, one from the Wealden of Cuckfield, the other from the Wealden of Brook, to *Pleurocœlus valdensis.* Their especial interest lies in the circumstance that, in connection with some opisthocœlous teeth, they afford absolutely conclusive evidence of the occurrence in the English Wealden of a diminutive opisthocœlous Dinosaur, which was the contemporary of the huge Ornithopsis, and the still more gigantic Pelorosaurus. (*Quar. Journ. Geol. Soc.*, May, 1890.)

Cretaceous.—According to Robert T. Hill (*Am. Geol.*, 1889) the Cretaceous exposures of the Texas-Arkansas region record two subsidences. Of the total sediments of the Lower, aggregating over 2,000 feet, 1,500 are limestone, all but 100 feet of which are of foraminiferal origin. Of the 700 feet of limestone of the Upper Cretaceous formation of Texas 600 feet are of foraminiferal origin.

J. S. Newberry (Trans. N. Y. Acad. Sci., Vol. IX.) gives the following reasons for considering the Laramie the upper member of the

Cretaceous, as first determined by Cope: 1st. It contains an invertebrate fauna that has in it many Cretaceous elements; *Mactra alta*, *Cardium speciosum*, and several species of Inoceramus being also found in the Fox Hill group. 2d. It contains, according to Cope and Marsh, a vertebrate fauna which is decidedly Cretaceous in character. 3d. The somewhat numerous mammals obtained from the Laramie by Cope and Marsh are reported by them to have decided Mesozoic characters.

Cenozoic.—Some fossil fish remains found in the Oligocene strata in the Isle of Wight have been referred by Mr. E. T. Newton to the genus Clupea and named *C. vectensis*. (*Quart. Journ. Geol. Soc.*, Feb. 1889).

Of seven species of fossil butterflies from Florissant, Cal., described by S. H. Scudder, six are new, and are referred by him to five new genera. Five of the seven belong to the sub-family Nymphalinæ, one to Pierinæ. The last represents a nearly extinct type, the sub-family Libytheinæ, and is of especial interest.

M. Deydier has found in the fresh-water limestone deposits of Ratavoux, near Cucuron, a mandible of *Castor jægeri* Kaup, a true Miocene species, which has not heretofore been recorded in the Leberon fauna. (Bull. Soc. Geol. de France, Tome dix-huitiéme.)

A fossil fish found in the Pliocene deposits near Antwerp has been referred by Raymond Stomes to the genus Thynnus, under the name *T. caldisii*. (Bull. Soc. Belge de Geol. de Paleon. et d'Hydrol., 1889.)

Plistocene.—In the Trans. Roy. Soc., 1889, Dr. J. W. Spencer discusses in detail the best developed beach of the Ontario basin, to which he gives the name Iroquois Beach. He does not agree with Mr. Gilbert as to the existence of glacial barriers closing the St. Lawrence valley. Not only is it unnecessary to believe in the existence of such a barrier to keep out the sea-water, as witness the present Gulf of Obi, but it seems impossible to believe in the existence of great glacial dams above sea-level sufficiently permanent to develop such regular beaches and terraces as the Iroquois, which indicate a wave-action of as long duration as that upon the modern beaches of Lake Ontario.

According to Dr. Spencer, in a paper read before the Geological Society of America, soundings demonstrate the presence of submarine valleys reaching upon all our coasts to depths of 3,000 feet or more; that these soundings show that within comparatively short distances

from their mouths the depth of the valleys, below the surface of the sea, sometimes did not exceed from 1,200 to 1,800 feet, but that beyond there was a greater increase of depth, within the last few leagues. In the fiords of Norway, merging into rapidly-contracting valleys, or headed by great vertical walls, hundreds of feet in height, may be seen the counterpart of the coast of the American continent just preceding the Plistocene period.

BOTANY.

Botany at the Indianapolis Meetings.—In the several meetings held in Indianapolis in August, including the American Association for the Advancement of Science, the Botanical Club, and the Society for the Promotion of Agricultural Science, there were many good papers on botanical subjects; in fact, it may be said that the average rank of the papers was considerably higher than in previous years. In the sessions of the Society for the Promotion of Agricultural Science the following botanical papers were read:

1. Preliminary Note on the Rotting of the Potato, by T. J. BURRILL; detailing experiments which show that in many cases, at least, the actual cause of the rotting is a Bacterium morphologically similar to *B. termo*, but differing from that species in its deportment towards nutrient media.

2. The Rots of the Sweet Potato, by B. D. HALSTED; indicating that there are four or five apparently distinct kinds of rots, due to the attacks of as many species of fungi.

3. Some Fungous Root Diseases, by L. H. PAMMEL; referring mainly to the cotton and sunflower plants.

4. The "Scab" of Wheat-Heads, by C. M. WEED; describing a disease of wheat which appears to be due to *Fusisporium culmorum*.

5. Some Recent Observations on the Black-Rot of the Grape, by B. T. GALLOWAY; detailing the results of experiments in inoculating the grape and Virginia creeper with ascospores, pycnidiospores, etc., of Phyllosticta.

6. A Comparative Test of Some of the Copper Preparations in the Treatment of Black-Rot of Grapes, by B. T. GALLOWAY; showing that by the use of such solutions the disease may be greatly reduced.

7. Biological Factors in the Nutrition of Plants, by M. MILES; referring to the rôle of micro-organisms in plant nutrition, and giving the results of experiments upon "clover tubercles."